WHAT IS CLAIMED IS:

1. An isolated nucleic acid molecule encoding a voltage-sensitive sodium channel of *Musca domestica*, wherein said voltage-sensitive sodium channel is capable of conferring sensitivity or resistance to an insecticide in *Musca domestica*.

2. The isolated nucleic acid molecule of claim 1 wherein said nucleic acid is deoxyribonucleic acid.

3. The isolated nucleic acid molecule of claim 2 wherein said deoxyribonucleic acid is cDNA.

4. The isolated nucleic acid molecule of claim 1 wherein said voltage-sensitive sodium channel confers susceptibility to an insecticide in *Musca domestica*.

5. The isolated nucleic acid molecule of claim 4 wherein said nucleic acid molecule has a nucleotide sequence as shown in SEQ ID NO:1.

6. The isolated nucleic acid molecule of claim 4 wherein said nucleic acid molecule encodes an amino acid sequence as shown in SEQ ID NO:3.

7. The isolated nucleic acid molecule of claim 1 wherein said voltage-sensitive sodium channel confers resistance to an insecticide in *Musca domestica*.

8. The isolated nucleic acid molecule of claim 7 wherein said nucleic acid molecule has a nucleotide sequence as shown in SEQ ID NO:2.

9. The isolated nucleic acid molecule of claim 7 wherein said nucleic acid molecule encodes an amino acid sequence as shown in SEQ ID NO:4.

10. The isolated nucleic acid molecule of claim 7 wherein said nucleic acid molecule has the nucleotide sequence of a second nucleic acid molecule with one or more mutations therein, wherein said second nucleic acid molecule encodes an insecticide sensitive voltage-sensitive sodium channel of *Musca domestica*, and wherein said one or more mutations in said second nucleic acid molecule render the resulting voltage-sensitive sodium channel resistant to an insecticide.

11. The isolated nucleic acid molecule of claim 10 wherein said nucleotide sequence of said second nucleic acid molecule encodes amino acid SEQ ID NO:3, and wherein said one or more mutations in said second nucleic acid molecule are selected from the group consisting of a substitution for amino acid residue 1014 of SEQ ID NO:3, a substitution for amino acid residue 1140 of SEQ ID NO:3, a substitution for amino acid residue 2023 of SEQ ID NO:3, a deletion of one or more of amino acid residues 2031-2034 of SEQ ID NO:3, a substitution for amino acid residue 2042 of SEQ ID NO:3, a substitution for amino acid residue 2054 of SEQ ID NO:3, and an insertion of one to three amino acid residues between amino acid residues 2055 and 2056 of SEQ ID NO:3.

12. The isolated nucleic acid molecule of claim 1 wherein said nucleic acid is ribonucleic acid.

13. The isolated nucleic acid molecule of claim 12 wherein said ribonucleic acid is mRNA.

14. An antisense nucleic acid molecule complementary to at least a portion of the mRNA of claim 13.

15. An expression vector comprising the antisense nucleic acid molecule of claim 14.

16. The expression vector of claim 15 wherein the expression vector is a baculovirus.

17. A method of decreasing expression of a voltage-sensitive sodium channel in an insect, said method comprising infecting an insect with the baculovirus vector of claim 16, wherein infection of said insect by said baculovirus results in incorporation of said antisense nucleic acid molecule into the genome of said insect, thereby blocking expression of voltage-sensitive sodium channels in said insect cell.

18. A ribozyme having a recognition sequence complementary to a portion of the mRNA of claim 13.

19. An expression vector comprising the ribozyme of claim 18.

20. The expression vector of claim 19 wherein the expression vector is a baculovirus.

21. A method of decreasing expression of a voltage-sensitive sodium channel in an insect, said method comprising infecting an insect with the baculovirus vector of claim 20, wherein infection of said insect by said baculovirus results in expression of said ribozyme in said insect, thereby decreasing expression of voltage-sensitive sodium channels in said insect cell.

22. A cell comprising the nucleic acid molecule of claim 1.

23. The cell of claim 22 wherein the cell is a *Xenopus* oocyte.

24. The cell of claim 22 wherein the cell is an insect cell line.

25. The cell of claim 24 wherein said insect cell line is selected from the group consisting of a *Drosophila Schneider* cell line, a *Drosophila* K_c cell line, an Sf9 cell line, and a High Five® cell line.

26. An expression vector comprising the nucleic acid molecule of claim 1.

27. The expression vector of claim 26 wherein said expression vector is selected from the group consisting of a plasmid and a virus.

28. A cell comprising the expression vector of claim 26.

29. The cell of claim 28 wherein the cell is a *Xenopus* oocyte.

30. The cell of claim 28 wherein the cell is an insect cell line.

31. The cell of claim 30 wherein said insect cell line is selected from the group consisting of a *Drosophila Schneider* cell line, a *Drosophila* K_c cell line, an Sf9 cell line, and a High Five® cell line.

32. The isolated nucleic acid molecule of claim 1 wherein said insecticide is selected from the group consisting of DDT, DDT analogs, and pyrethroids.

33. A method of producing a voltage-sensitive sodium channel, said method comprising:

introducing the nucleic acid molecule of claim 1 into a cell; and

allowing said cell to express said nucleic acid molecule resulting in the production of a voltage-sensitive sodium channel in said cell.

34. The method of claim 33 wherein the cell is a *Xenopus* oocyte.

35. The method of claim 33 wherein the cell is an insect cell line.

36. The method of claim 35 wherein said insect cell line is selected from the group consisting of a *Drosophila Schneider* cell line, a *Drosophila* K_c cell line, an Sf9 cell line, and a High Five® cell line.

37. A method of producing a voltage-sensitive sodium channel, said method comprising:

introducing the nucleic acid molecule of claim 1 and a second nucleic acid molecule encoding a tip E protein into a cell; and

allowing said cell to coexpress said nucleic acid molecule and said second nucleic acid molecule, resulting in the production of a voltage-sensitive sodium channel in said cell.

38. The method of claim 37 wherein the cell is a *Xenopus* oocyte.

39. The method of claim 37 wherein the cell is an insect cell line.

40. The method of claim 39 wherein said insect cell line is selected from the group consisting of a *Drosophila Schneider* cell line, a *Drosophila* K_c cell line, an Sf9 cell line, and a High Five® cell line.

41. A method of screening a chemical agent for the ability of the chemical agent to modify sodium channel function, said method comprising:

introducing the nucleic acid molecule of claim 1 into a host cell;

expressing said voltage-sensitive sodium channel encoded by said nucleic acid molecule in the host cell so as to result in the functional expression of a voltage-sensitive sodium channel in the host cell;

exposing the cell to a chemical agent; and

evaluating the exposed cell to determine if the chemical agent modifies the function of the voltage-sensitive sodium channel.

42. The method of claim 41 wherein the cell is a *Xenopus* oocyte.

43. The method of claim 41 wherein the cell is an insect cell line.

44. The method of claim 43 wherein said insect cell line is selected from the group consisting of a *Drosophila Schneider* cell line, a *Drosophila* K_c cell line, an Sf9 cell line, and a High Five® cell line.

45. The method of claim 41 wherein said evaluation comprises monitoring sodium transport through said voltage-sensitive sodium channel.

46. The method of claim 41 wherein said evaluation comprises monitoring guanidinium transport through said voltage-sensitive sodium channel.

47. A method of screening a chemical agent for the ability of the chemical agent to modify sodium channel function, said method comprising:

introducing the nucleic acid molecule of claim 1 and a second nucleic acid molecule encoding a tip E protein into a host cell;

allowing said host cell to coexpress said nucleic acid molecule and said second nucleic acid molecule so as to result in the functional expression of a voltage-sensitive sodium channel in the host cell;

exposing the cell to a chemical agent; and

evaluating the exposed cell to determine if the chemical agent modifies the function of the voltage-sensitive sodium channel.

48. The method of claim 47 wherein the cell is a *Xenopus* oocyte.

49. The method of claim 47 wherein the cell is an insect cell line.

50. The method of claim 49 wherein said insect cell line is selected from the group consisting of a *Drosophila Schneider* cell line, a *Drosophila* K_c cell line, an Sf9 cell line, and a High Five® cell line.

51. The method of claim 47 wherein said evaluation comprises monitoring sodium transport through said voltage-sensitive sodium channel.

52. The method of claim 47 wherein said evaluation comprises monitoring quanidinium transport through said voltage-sensitive sodium channel.

53. A method of obtaining DNA encoding a voltage-sensitive sodium channel, said method comprising:

selecting a DNA molecule encoding a voltage-sensitive sodium channel of an insect, said DNA molecule having a nucleotide sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:2;

designing an oligonucleotide probe for a voltage-sensitive sodium channel based on SEQ ID NO:1 or SEQ ID NO:2;

probing a genomic or cDNA library of an insect with the oligonucleotide probe; and

obtaining clones from said library that are recognized by said oligonucleotide probe, so as to obtain DNA encoding a voltage-sensitive sodium channel.

54. A method of obtaining DNA encoding a voltage-sensitive sodium channel, said method comprising:

selecting a DNA molecule encoding a voltage-sensitive sodium channel of an insect, said DNA molecule having a nucleotide sequence selected from the group consisting of SEQ ID NO:1 and SEQ ID NO:2;

designing degenerate oligonucleotide primers based on SEQ ID NO:1 or SEQ ID NO:2; and

utilizing said oligonucleotide primers in a polymerase chain reaction on a DNA sample to identify homologous DNA encoding a voltage-sensitive sodium channel in said sample.

55. An isolated nucleic acid molecule encoding a voltage-sensitive sodium channel of an insect, said nucleic acid molecule encoding a first amino acid sequence

having at least 95% amino acid identity to a second amino acid sequence, said second amino acid sequence being as shown in SEQ ID NO:3.

56. An isolated nucleic acid molecule encoding a voltage-sensitive sodium channel of an insect, said nucleic acid molecule encoding a first amino acid sequence having at least 95% amino acid identity to a second amino acid sequence, said second amino acid sequence being as shown in SEQ ID NO:4.

57. An isolated voltage-sensitive sodium channel of *Musca domestica*, wherein said voltage-sensitive sodium channel is capable of conferring sensitivity or resistance to an insecticide in *Musca domestica*.

58. The voltage-sensitive sodium channel of claim 57 wherein said voltage-sensitive sodium channel confers susceptibility to an insecticide in *Musca domestica*.

59. The voltage-sensitive sodium channel of claim 58 wherein said voltage-sensitive sodium channel is encoded by a nucleotide sequence as shown in SEQ ID NO:1.

60. The voltage-sensitive sodium channel of claim 58 wherein said voltage-sensitive sodium channel is comprised of a protein having an amino acid sequence as shown in SEQ ID NO:3.

61. The voltage-sensitive sodium channel of claim 57 wherein said voltage-sensitive sodium channel confers resistance to an insecticide in *Musca domestica*.

62. The voltage-sensitive sodium channel of claim 61 wherein said voltage-sensitive sodium channel is encoded by a nucleotide sequence as shown in SEQ ID NO:2.

63. The voltage-sensitive sodium channel of claim 61 wherein said voltage-sensitive sodium channel is comprised of a protein having an amino acid sequence as shown in SEQ ID NO:4.

64. The voltage-sensitive sodium channel of claim 61 wherein said voltage-sensitive sodium channel is encoded by a nucleic acid molecule having the nucleotide sequence of a second nucleic acid molecule with one or more mutations therein, wherein said second nucleic acid molecule encodes an insecticide sensitive voltage-sensitive sodium channel of *Musca domestica*, and wherein said one or more mutations in said second nucleic acid molecule render the resulting voltage-sensitive sodium channel resistant to an insecticide.

65. The voltage-sensitive sodium channel of claim 64 wherein said nucleotide sequence of said second nucleic acid molecule encodes amino acid SEQ ID NO:3, and wherein said one or more mutations in said second nucleic acid molecule are selected from the group consisting of a substitution for amino acid residue 1014 of SEQ ID NO:3, a substitution for amino acid residue 1140 of SEQ ID NO:3, a substitution for amino acid residue 2023 of SEQ ID NO:3, a deletion of one or more of amino acid residues 2031-2034 of SEQ ID NO:3, a substitution for amino acid residue 2042 of SEQ ID NO:3, a substitution for amino acid residue 2054 of SEQ ID NO:3, and an insertion of one to three amino acid residues between amino acid residues 2055 and 2056 of SEQ ID NO:3.

66. The voltage-sensitive sodium channel of claim 57 wherein said insecticide is selected from the group consisting of DDT, DDT analogs, and pyrethroids.

67. An antibody or fragment thereof specific for the voltage-sensitive sodium channel of claim 57.

68. The antibody of claim 67 wherein said antibody comprises a monoclonal antibody.

69. The antibody of claim 67 wherein said antibody comprises a polyclonal antibody.

70. A method of detecting presence of a voltage-sensitive sodium channel in a sample, said method comprising:

contacting a sample with the antibody or fragment thereof of claim 67, wherein said antibody or fragment thereof binds to any of said voltage-sensitive sodium channel present in said sample, forming a complex therewith; and

detecting said complex, thereby detecting presence of a voltage-sensitive sodium channel in said sample.

71. An isolated voltage-sensitive sodium channel of *Musca domestica*, wherein the voltage-sensitive sodium channel is comprised of a protein having a first amino acid sequence with at least 95% amino acid identity to a second amino acid sequence, said second amino acid sequence being as shown in SEQ ID NO:3.

72. An isolated voltage-sensitive sodium channel of *Musca domestica*, wherein the voltage-sensitive sodium channel is comprised of a protein having a first amino acid sequence with at least 95% amino acid identity to a

second amino acid sequence, said second amino acid sequence being as shown in SEQ ID NO:4.

73. A plasmid designated pPJI1 and deposited with the American Type Culture Collection under Accession No. _________.

74. A KpnI/AatII restriction fragment of the plasmid designated pPJI1 of claim 73, said restriction fragment being about 3620 bp.

75. A plasmid designated pPJI2 and deposited with the American Type Culture Collection under Accession No. _________.

76. An AatII/SphII restriction fragment of the plasmid designated pPJI2 of claim 75, said restriction fragment being about 2700 bp.

77. An isolated nucleic acid molecule consisting of a KpnI/AatII restriction fragment of about 3620 bp of the plasmid designated pPJI1 ligated at the AatII site to the AatII site of an AatII/SphII restriction fragment of about 2700 bp of the plasmid designated pPJI2.

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